

A-14

X-ray Photon Correlation Spectroscopy Measurements of Dynamics within Concentrated Eye Lens Protein Suspensions

Janae E. DeBartolo¹, V. N. C. Karunaratne¹, Justin D. Berry¹, Curt M. DeCaro¹, Laurence B. Lurio^{1,2}, Alec Sandy²,

Suresh Narayanan², John Weizeorick², and George M. Thurston³

¹Department of Physics, Northern Illinois University, DeKalb, IL 60115

²Advanced Photon Source, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439

³Department of Physics, Rochester Institute of Technology, Rochester, NY 14623

X-ray photon correlation spectroscopy (XPCS) has been applied in recent years to the study of dynamics within a wide range of soft materials. Its application to protein diffusion has been hindered by the weak scattering and the susceptibility of proteins to damage. We report the first application of XPCS to study the dynamics of concentrated suspensions of alpha and gamma crystallin proteins extracted from bovine eye lens. The limitations of low flux and x-ray damage were overcome through a combination of a fast, high-efficiency CCD, a kinoform lens, and by limiting exposures to short intervals. Dynamics were measured both for alpha crystallin suspended in a concentrated matrix of gamma crystallin and concentrated alpha crystallin suspensions, showing time constants of a few tenths of seconds at length scales corresponding to the protein diameter.